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ABSTRACT

In an effort to meet the growing demand for skilled radiologic technologists and other supportive personnel educated through the associate degree level, a national survey was conducted as part of the UCLA Allied Health Professions Project to determine the tasks performed by personnel in the field and lay the groundwork for development of curriculum materials. A task inventory composed of radiology, administrative, clerical, research, and miscellaneous tasks was developed by the project staff in cooperation with a team of radiology experts and was sent to 169 persons employed in the radiology department of 30 health care facilities. Responses from 117 employees revealed that: (1) There appears to be a significant differentiation between the various levels of radiologic personnel in terms of tasks performed; and (2) There is little indication that a career ladder exists in the field of hospital radiology. On the basis of survey results, the project staff rated the importance of each task in terms of inclusion in a curriculum for the four levels of radiologic personnel, including chief technologist, staff technologist, technical support, and non-technical support. The survey questionnaire and other study materials are appended. (SB)

THE UCLA ALLIED HEALTH PROFESSIONS PROJECT

OCCUPATIONAL ANALYSIS

HOSPITAL RADIOLOGIC TECHNOLOGIST

UNIVERSITY OF CALIFORNIA, LOS ANGELES
DIVISION OF VOCATIONAL EDUCATION
ALLIED HEALTH PROFESSIONS PROJECT

MARCH 1972

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UNIVERSITY OF CALIFORNIA, LOS ANGELES
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Occupational Analysis

HOSPITAL RADIOLOGIC TECHNOLOGIST

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Radiologic Technologist (Chief) 078.168
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UNIVERSITY OF CALIFORNIA, LOS ANGELES
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F O R E W O R D

The Division of Vocational Education, University of California, is an administrative unit of the University which is concerned with responsibilities for research, teacher education, and public service in the broad area of vocational and technical education. During 1968 the Division entered into an agreement with the U.S. Office of Education to prepare curricula and instructional materials for a variety of allied health occupations. For the most part, such materials are related to pre-service and in-service instruction for programs ranging from on-the-job training through the Associate degree level.

A National Advisory Committee, drawn from government, education, professional associations in the health care field, and the lay public, provides guidance and help to the over-all activities of the Allied Health Professions Project. The following individuals and institutions participate in the activities of this nationwide interdisciplinary body:

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In addition, each of the specialized programs comprising the Projects has the benefit of consultation with a National Technical Advisory

Committee of persons especially knowledgeable in the occupational area concerned. In the case Radiologic Technology, a distinguished group of practitioners and educators met in 1969 to select and approve a functional list encompassing all tasks performed in the Radiologic Laboratory. This list was utilized in constructing a research instrument that was applied in a nation-wide survey of personnel practices. Results of the study will provide the basis for the development of appropriate curricula and instructional materials for pre-service and in-service training of Radiologic Technologists.

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PREFACE

The Allied Health Professions Project (AHPP) was initiated in August, 1968, by the Division of Vocational Education of the University of California, Los Angeles, for the purpose of developing curricula and instructional materials for use in allied health-related educational programs. This work is supported by Research and Demonstration Grant 8-0627, from the U.S. Office of Education, Department of Health, Education, and Welfare.

In the past 20 years the United States has experienced a very large increase in demand for health services of all kinds. As a result, there is a shortage of many types of skilled personnel. This personnel deficit can best be resolved through increased educational efforts. An effective educational program requires relevant curriculum and instructional materials, hence the effort to direct funds and energy to the development of such materials as rapidly as possible.

Hospital Radiologic Technology was selected by the Allied Health Professions Project as one of the allied health professions suffering a shortage of qualified manpower. In an effort to meet the growing demand for skilled radiologic technologists and other supportive personnel educated through the AA level, a national survey was undertaken to determine the tasks performed by personnel employed in the field, to lay the groundwork for the development of educational materials geared to current personnel practices in health care facilities.

It is customary in developing vocational education curricula and instructional materials to depend upon experts for recommendations about technical content, and for help in validating the material once it has been produced. Accordingly, a National Technical Advisory Committee (NTAC) was formed for the occupation of Hospital Radiologic Technology. Among the members of the committee were practitioners, educators, and employers currently active in the field, as listed below.

ROSTER

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The committee met in Los Angeles in May, 1969 and formulated the basic task list out of which the survey instrument was developed.[1] At a later date Robert W. Olson, M.D., of Santa Barbara, California, was designated by the American College of Radiology as its official representative on the National Technical Advisory Committee.[2]

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[1] Richard A. McCartney, Meeting Report, National Technical Advisory Committee for Radiologic Technology. Los Angeles: UCLA Allied Health Professions Projects, 1969.

[2] Progress Report, UCLA Allied Health Professions Project, October, 1969.

In the course of activities, adherence to sound standards of Radiologic Technology was assured by consultation with local practitioners.

The survey was conducted among radiologic laboratory personnel in a nationwide list of health care facilities, as described in the present report. Findings will be incorporated into a curriculum based on the concept of behavioral objectives (student performance goals).

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SUMMARY

Objectives:

1. To summarize and analyze the results of a national survey of Hospital Radiologic personnel.

2. To determine what tasks are currently being performed by different levels of personnel in Hospital Radiology Departments.

3. To make recommendations and set priorities for the development of educational materials.

Procedures:

1. Establishment of an NTAC composed of practitioners, educators and employers.

2. Review of the relevant literature, job descriptions, and educational programs.

3. Collection and analysis of the results of the national hospital survey of Radiologic personnel.

Findings and Recommendations:

1. There appears to be a significant differentiation between the various levels of Radiologic personnel in terms of tasks performed.

2. There is little indication that a career ladder exists in the field of Hospital Radiology.

3. Recommendations are proposed for the development of educational materials for different levels of personnel.

I. INTRODUCTION

Early in 1968, the Division of Vocational Education of the University of California was funded by the United States Office of Education to study the allied health occupations. The Allied Health Professions Project (AHPP) was initiated as a research and demonstration program with the goal of producing curricula and instructional materials to be used in pre-service and in-service training of allied health personnel through the Associate degree level. The objectives of the project were: (1) to develop curricula and instructional materials for a variety of allied health occupations; (2) to develop innovative instructional programs for pre-service and in-service training in the selected occupations; (3) to establish a curriculum information center for the allied health professions; and (4) to provide ongoing evaluation and upgrading of the programs developed.

Since the discovery of X-rays by Wilhelm Konrad Roentgen in 1895, the science of radiology has grown with tremendous strides, and now occupies an important position in clinical medicine.[1] In order to meet the ever-growing demand for qualified personnel, a comprehensive educational program is required to train employees for a variety of occupational levels. To determine the nature of the need the Allied Health Professions Project initiated a national survey of hospital radiologic personnel.

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[1] Isadore Meschan. Normal Radiographic Anatomy. Philadelphia; W.B. Saunders Company. 1959.

The results of the survey have enabled the Project to determine current personnel practices within the occupation, and also will serve as a foundation for the development of curriculum. The present paper reports the findings of the national survey.

II. PROCEDURE

The first step in the Project methodology was the development of an inclusive task inventory for the occupations in the field of radiology. This list included all possible tasks being performed by employees currently working in each job category. Validation of the task list was considered a necessary point of departure for the preparation of educational materials based on the skills required for satisfactory performance of radiology tasks.

A detailed task inventory, though to include all possible tasks identified as being performed in the Radiology Department, was then developed by the Allied Health staff in coordination with a team of experts in the field of Hospital Radiology. On May 1, 1969, the first meeting of the National Technical Advisory Committee (NTAC) for Hospital Radiologic Technology convened at the Project headquarters. The roster comprised eight experts, including practitioners, employers, and educators currently active in the area of radiology. The committee formulated the initial task list, based on a functional analysis of the radiologic technologist's activities as developed by Dr. Raymond E. Christal, Chief of the Occupational and Career Development Branch, U.S. Air Force, Lackland Air Force Base, Texas. Revisions of this basic list were discussed and implemented according to the general consensus of the Committee.

The task list underwent final revision in the Spring of 1971, just prior to survey. At this time an effort was made to update the list so as to incorporate recent advances and changes

in the practice of radiologic functions. The final revision incorporated information obtained from a study of available job descriptions, a review of the literature pertinent to this occupational field, and consultations with expert practitioners.

III. THE SURVEY

A. Design and objectives of the survey instrument

The task inventory was adapted to AHPP questionnaire format, and was used to survey a national sample of hospital employees active in the field of radiology. The statement of each task on the survey instrument was followed by four questions:

1. Do you perform this task?
2. Do you supervise the performance of this task?
3. How often do you perform this task?
4. How difficult is this task?

The respondents were instructed to answer the performance and supervision questions for all of the tasks. The questions on frequency and difficulty were to be answered only when the respondent indicated that he either performed or supervised the corresponding task.

Questions concerning the respondents' education, experience, salary and other selected variables were contained on a Background Information Sheet. This information was used in forming occupational groups within the survey sample and in describing the characteristics of each group. It was emphasized that all responses would be held in strict confidence, and that data would be used and reported in statistical form only.

A copy of the instructions given to the respondents for the self-administered questionnaire, a sample of Background Information Sheet, and the first page of the survey

questionnaire are shown in Appendix I. A complete listing of tasks included in the questionnaire is contained in the Results section of this report.

From the standpoint of curriculum construction, the survey results should provide information about the different levels and categories of personnel that perform each of the tasks in the questionnaire. It can be assumed that performance of a task by substantial proportions of one or more categories of personnel would constitute a prima facie case for inclusion of the task in any curriculum intended for the instruction of such personnel. Similarly, if it is found that certain categories of personnel typically supervise the performance of a task done by others, the knowledge and skills required for efficient supervision of the task should also be included in their curricula. Whether or not the skills required to supervise the performance of a task are equivalent to those needed to actually perform the task is, admittedly, an open question at the present time. For the purpose of the present report, however, the AHPP staff has assumed that effective supervision of a task implies that the supervisor must be able to perform the task as well as to supervise its performance by others.

In addition to supplying information about the percentage of respondents who perform or supervise the tasks, the analysis of survey response also reveals the frequency with which these tasks are performed and provides an indication of how difficult the respondents feel the tasks are. These indices should

provide guidance for the relative degree of emphasis given to the various tasks when curricula are formulated. It should be mentioned, in passing, that the results of a survey such as this do not constitute a complete prescriptive guide to the design of curriculum; they are meant to serve only as a means of assisting, not of replacing, the critical judgments required for curriculum development.

B. The Survey Sample

The survey respondents were selected from Radiology personnel employed in 48 health care facilities in six metropolitan areas: Birmingham, Boston, Chicago, Denver, Los Angeles, and Seattle. Within a 200-mile radius of each city, two large hospitals (200 or more beds), two medium-sized hospitals (100 to 199 beds), two small hospitals (fewer than 100 beds), and two extended-care facilities were selected to comprise the national sample for this and other surveys conducted by the Allied Health Professions Project. Selections within the metropolitan areas first were made randomly from among facilities accredited by the Joint Commission on Accreditation (AHA) and approved by Medicare. Local hospital associations then were consulted and substitutions were made for any of the facilities that were considered to be uncooperative toward survey projects. Other substitutions were made later for facilities that withdrew from the Project. The composition of the facility sample at the time the present survey was conducted is shown in Appendix II.

Selection of respondents within each facility was guided by information obtained in advance about the numbers and kinds of personnel employed in the facility. Most of the extended-care facilities reported that they did not provide the services of a Radiology Department for their patients. Many of the smaller hospitals had very small Radiology Departments, if any--often no more than one or two members. Consequently, no attempt was made to obtain equal proportions of respondents from smaller and larger facilities. For example, it is possible that the entire staff of a small institution was asked to respond to the questionnaire, while selection of respondents was required in a large institution.

Of the original 48 health care facilities in the survey sample, 10 of the extended care facilities had previously indicated that they did not have Radiology Departments. Of the remaining 38 institutions, 30 responded to the AHPP pre-survey which was designed to obtain a complete listing of personnel employed in the Radiology Department of each facility. From this list of 290 employees, 169 were selected by position title to be surveyed.

The survey questionnaires were sent in bulk to a member of the administrative staff of each facility who had previously agreed to assist in the survey. This person then distributed the questionnaires to a specified number of radiology department workers, according to position titles.

A total of 117 questionnaires was returned from 26[1] facilities, making for a response rate of 69 percent. Efforts to increase both the percentage of response and the number of participating institutions were unsuccessful. Table 1 presents the response by facility size and geographical area. Some geographical imbalance was produced in the sample by the small numbers of hospitals in the Boston and Los Angeles areas which provided the Project with personnel lists.

TABLE 1

Response Rate by Geographical Region and Hospital Size

	200 or more	199 100	99 or less	ECF*	Total	Percentage of returns
Birmingham	18/23[a]	3/7	0/6	0/0	21/36	58
Boston	5/7	3/8	2/2	1/1	11/18	61
Chicago	14/23	5/11	1/9	0/0	20/43	47
Denver	16/17	2/4	7[b]/17	0/0	25/35	69
Los Angeles	0/0	5/8	2/3	0/3	7/14	50
Seattle	3/9	7/7	6/7	0/0	16/23	70
Total	56/79	25/45	18/41	1/4	100+(17)[c]/169	69
Percent of Response	71	56	44	25	69	69

*Extended Care Facilities (Only two ECF's indicated they had Radiology Departments.)

[a]Number of responses/number of questionnaires distributed.

[b]Includes one questionnaire received after the closing date and not included in the data analysis.

[c]Includes 17 respondents who failed to supply hospital identification. These respondents were excluded from this tabulation.

[1]In addition, 17 respondents did not indicate hospital identification.

IV. DATA ANALYSIS

A. Analysis of Respondent Background Information

Fifteen respondents were excluded from the analysis of background information because it was felt that their functions were not directly related to radiology, as shown in Appendix IV. These respondents included students, miscellaneous employees, and respondents who did not identify their position titles. The late return also was excluded. Background data analysis was then completed for the remaining 101 respondents.

When asked to specify their positions, the respondents reported 22 different occupational titles. To create larger functional groups within the sample for tabulation of the data, the titles reported were consolidated to form five occupational groups within the field of hospital radiology. These groups were:

1. Radiologist
2. Chief and Assistant Chief Technologist
3. Staff Technologist
4. Technical Supportive Personnel (employees whose titles indicated technical expertise in the application of one or more radiologic procedures)
5. Non-Technical Supportive Personnel (employees whose titles indicated clerical or administrative functions)

The occupational titles incorporated under each of these five groupings are presented below:

1. Radiologist (M.D.) n=5

   Chief of Radiology
   Chief Radiologist
   Supervising Radiologist

2. Chief and Assistant Chief Technologist (n=34)

Chief of Radiology Technology
Chief X-ray Technologist
Assistant Chief X-ray Technologist
Assistant Chief X-ray Technician

3. Staff Technologist (n=37)

Radiology Technician
X-ray Technician
Senior Radiology Technician
Staff Radiology Technician

4. Technical Supportive Personnel (n=8)

X-ray Technician Aide
Aide
Dark Room Technician
Developer
Microfilm Clerk

5. Non-Technical Supportive Personnel (n=17)

Administrative Assistant
Radiology Administrative Assistant
Clerk
Typist
Secretary
Transcriptionist

Background information about each respondent was also obtained for a number of socio-economic variables including sex, education, and salary. A review of these and other selected characteristics can be found in Appendix III.

B. Statistical Analysis of the Data

The processing and reduction of both survey response and background data were provided by the Survey Research Center of the University of California at Los Angeles. Data were obtained for the percentage of respondents performing each of the tasks, the frequency with which the tasks were performed, and the respondent's perceived difficulty of task performance. This information is reported for each of the five occupational

groups specified above.

The proportion of respondents performing each of the tasks was reported as a percentage score, rounded to the nearest 5 percent. Data on the mode frequency of performance were reported using the symbols D (for daily), W (for weekly), and M (for monthly). The first two frequency categories in the questionnaire ("several times a day," "daily [or] several times a week") were combined to form the "daily" category. In the analysis of the data, the mode score (the score most frequently indicated) was used in preference to the mean (the arithmetical average) because it was found that in many cases the mean was not representative of any of the respondents. Wherever there was a bimodal distribution, the upper modal value was reported, that is, the more frequent value was used.

Data on the mode difficulty of performance for each task were designated by the symbols E (for easy), A (for average), and H (for hard). For reasons mentioned above, the mode value was employed in preference to the mean. In the case of a biomodal distribution, the "easier" value was reported.

V. RESULTS

For convenience, the task list was divided into five functional sections: Radiology Tasks; Clerical Tasks; Administrative Tasks; Research Tasks; and Miscellaneous Tasks. The data are reported separately for each of these functional sections. Tables 2 through 6 depict the percent of performance, frequency of task performance, and difficulty of task performance as reported by the survey respondents from each of the occupational groups. Directly preceding each table is a summary and discussion of the statistical findings.

A. Radiology Tasks (94 tasks)

The 94 tasks in this functional area are directly concerned with the collection and analysis of radiologic data. Included within this area are tasks related to the maintenance of radiologic equipment and supplies, the administration of the various X-ray tests and procedures, and a variety of other tasks relevant to the clinical practice of radiology. Results of this analysis are given in Table 2, page 22.

PERFORMANCE

1. The Radiologists reported that they were actively involved in performing a majority of the tasks in this area. Five of the tasks, No. 1, "Review patient's clinical history," No. 12, "Place patient in radiographic position," No. 16, "Administer radiopaque preparations," No. 38, "Operate image intensifier fluoroscopic units," and No. 47, "Assist with hysterosalpingograms," were performed by all the respondents in this category. Tasks which were performed most frequently were generally those designating the application of a specific examination or procedure, such as Task 57, "Assist with scanograms," which was performed by 80 percent of the respondents. The tasks which were least performed by the Radiologist group related to the operation and care of certain radiologic equipment. For example, tasks involving the use of cobalt machines, a betatron, a linear accelerator, or low voltage roentgen therapy equipment (Task No. 79, 85, 86, and No. 84, respectively) were not performed by any of the respondents. It seems likely that the hospitals

included within the survey sample were not generally equipped with these types of radiation therapy units. Had the survey sample included large research-oriented hospitals affiliated with universities, it is probable that more of the respondents would report using this type of equipment.

2. Chief and Assistant Chief Technologists: The pattern of performance by this group closely approximated that of the Radiologists. Forty-eight of the 94 Radiology tasks were performed by at least 50 percent of the respondents. As is the case with the Radiologists, the tasks which were most performed are related to the administration of specific radiologic examinations and procedures such as Task No. 31, "Take chest X-rays," which was performed by 85 percent of the respondents. Several of these tasks are performed less frequently by the Chief and Assistant Chief Technologist as compared to the Radiologist. For example, Task No. 42, "Assist with cardiac catheterization and angiocardiogram procedures," is performed by 80 percent of the Radiologists and only 20 percent of Chief Technologists. Also, it appears that the operation of some equipment--Task No. 37, "Operate cinefluorographic equipment," and Task No. 82, "Perform radioisotope therapy," is most often handled by the Radiologist and is generally beyond the scope of activities performed by the Chief Technologist.

3. Staff Technologists: This group differed from the others in that it designated the highest percentage of performance for many of the radiology tasks. For example,

16 of the tasks in this functional area were performed by at least 90 percent of the Staff Technologists. The majority of these 16 tasks involved the performance of routine X-ray procedures such as Task No. 31, "Take chest X-ray," and Task No. 33, "Take mastoid X-rays." Apart from indicating a higher percentage of performance for many of the tasks, the Staff Technologists reported a pattern of task performance similar to the Radiologists and Chief Technicians. That is, they generally performed those tasks dealing with the administration of basic radiologic tests and procedures, while they were not as involved in those tasks requiring the use of radiation therapy equipment.

4. Technical Support: The technical support personnel were far less involved in the performance of the radiology tasks than were the preceding three groups. Only five of the 94 radiology tasks were performed by 50 percent or more of these employees. Interestingly, all five of these tasks were concerned with the servicing and operation of ancillary radiologic equipment, such as Task No. 3, "Load and unload film units," and Task No. 10, "Number cassettes or screens for identification."

5. Non-Technical Support: This group was relatively inactive in performing any of the 94 radiology tasks. Task No. 3, "Load and unload film units," was the most performed task, and it was performed by only 20 percent of the personnel.

FREQUENCY

The mode frequency of performance for each of the five

occupational groups was Daily for most the tasks. There appear to be few differences across the groups in terms of the frequency dimension, with the exception of the Non-Technical Support Personnel. As mentioned above, this group indicated the lowest percentage of performance of the radiology tasks. In addition, it appears that they perform them infrequently.

The tasks which were performed most often were generally concerned with the administration of the basic radiologic examinations. For example, Task No. 60, "Assist with upper G.I. series," and No. 49, "Assist with intravenous pyelograms," were performed with a mode frequency of Daily by all five of the groups. In contrast, tasks which were performed least frequently were generally related to the maintenance and care of the laboratory equipment, such as Task No. 92, "Replace and mount X-ray screens," in which the mode frequency of performance was Monthly for all of the occupational groups when performance was indicated.

DIFFICULTY

The majority of the tasks were rated Easy by the respondents as a whole. It might be expected that the two support groups would find the tasks in this area to be more difficult than would the other groups. Surprisingly, the opposite is true; when these respondents performed the tasks, they almost invariably reported them to be Easy. In contrast, the physicians, Chief Technicians, and Staff Technologists reported that they found many of the tasks to be of Average difficulty.

Table 2. Percentage of Respondents Performing Radiology Tasks and Reported Frequency and Difficulty of Performance by Occupational Category (N=101)

A. Radiology Tasks	Group 1 Radiologist n=5			Group 2 Chief Technologist n=34			Group 3 Staff Technologist n=37			Group 4 Technical Support n=8			Group 5 Non-Technical Support n=17		
	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.
1. Review patient's clinical history	100	D	A	70	D	E	65	D	E	10	D	A	10	D	E
2. Prepare trays for special examinations	60	D	E	60	D	E	70	W	E	25	D	E	5	M	A
3. Load and unload film units	60	D	E	75	D	E	85	D	E	60	D	E	20	D	E
4. Use polaroid units	40	D	E	40	W	E	25	D	E	10	D	E	10	W	E
5. Position patients for treatment	60	W	A	40	D	A	55	D	E	25	D	E	5	M	E
6. Prepare written radiology therapy instructions for patients	40	D	A	20	D	E	0	0	0	10	D	E	0	0	0
7. Store radioactive materials	60	D	E	25	W	E	25	W	E	10	D	E	5	M	E
8. Wash and sterilize treatment facilities	40	W	A	35	D	E	20	W	E	10	D	E	10	D	E
9. Assist in treatment planning	40	D	E	20	D	E	10	W	E	0	0	0	0	0	0
10. Number cassettes or screens for identification	40	W	E	65	M	E	45	M	E	50	D	E	10	W	A
11. Select immobilization devices	40	D	E	70	D	E	55	D	E	10	D	E	15	D	E
12. Place patient in radiographic position	100	D	E	75	D	E	95	D	E	25	D	E	15	D	E
13. Clean radiographic equipment	40	D	E	70	D	E	90	D	E	50	D	E	15	W	E
14. Affix lead shield to cassette for identification	40	W	E	40	D	E	45	D	E	25	D	E	10	D	E
15. Prepare contrast media such as barium sulphate	40	D	E	75	D	E	[illegible]	D	E	50	D	E	15	D	E

Table 2. Continued

Radiology Tasks	Group 1 Radiologist n = 5 %	Freq.	Dif.	Group 2 Chief Technologist n = 34 %	Freq.	Dif.	Group 3 Staff Technologist n=37 %	Freq.	Dif.	Group 4 Technical Support n=8 %	Freq.	Dif.	Group 5 Non-Technical Support n=17 %	Freq.	Dif.
16. Administer radiopaque preparations	100	D	E	50	D	E	75	D	E	10	D	E	10	D	E
17. Determine and adjust control panel settings such as voltage, amperage, and time exposure	80	D	E	85	D	E	95	D	E	25	D	E	15	D	A
18. Assist physician in special procedures	40	D	A	80	D	A	95	D	A	25	D	E	15	W	E
19. Operate video tape equipment	20	D	A	10	D	E	20	W	E	25	D	E	0	0	0
20. Load cameras for cinefluorography	20	W	E	15	D	A	25	W	E	10	D	E	5	D	E
21. Make catheters for special X-ray examinations	20	W	A	15	W	A	0	0	0	10	D	0	0	0	0
22. Operate autoclave	20	W	E	10	D	E	0	0	0	0	0	0	0	0	0
23. Process films in surgery	40	D	E	50	W	E	70	D	E	25	D	E	5	D	E
24. Label and transfer specimens	20	D	E	25	W	E	40	W	E	10	D	E	15	D	E
25. Maintain silver recovery operation	40	M	E	35	M	E	20	M	E	0	0	0	10	M	E
26. Perform safety check for exposure safelights	40	M	E	55	M	E	15	M	E	10	D	E	10	M	E
27. Test for scatter radiation	40	M	E	55	M	A	25	M	E	0	0	0	10	M	E
28. Take dental X-rays	40	D	E	30	M	E	25	M	A	0	0	0	5	M	A
29. Take abdominal X-rays	60	D	A	80	D	E	95	D	E	25	D	E	15	D	E
30. Take spinal X-rays	60	D	A	75	D	E	95	D	E	25	D	E	15	D	E

Table 2. Percentage of Respondents Performing Radiology Tasks and Reported Frequency and Difficulty of Performance by Occupational Category (N=101)
Continued

Radiology Tasks	Group 1 Radiologist n=5			Group 2 Chief Technologist n=34			Group 3 Staff Technologist n=37			Group 4 Technical Support n=8			Group 5 Non-Technical Support n=17		
	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.
31. Take chest X-rays	60	D	E	85	D	E	95	D	E	25	D	E	15	D	E
32. Take facial X-rays	60	D	E	80	D	A	95	D	E	25	D	E	15	D	E
33. Take mastoid X-rays	60	D	A	75	W	A	90	M	A	25	D	E	10	D	E
34. Take paranasal X-rays	60	D	A	80	D	E	95	D	E	25	D	E	15	D	E
35. Take X-rays of extremities	60	D	E	80	D	E	95	D	E	25	D	E	15	D	E
36. Take X-rays of ribs and sternum	60	D	E	80	D	A	95	D	E	25	D	E	15	D	E
37. Operate cinefluorographic equipment	60	D	A	10	D	E	20	D	E	10	D	E	10	D	E
38. Operate image intensifier fluoroscopic units	100	D	E	70	D	E	65	D	E	25	D	E	15	D	E
39. Operate mobile X-ray units	60	D	E	80	D	A	80	D	E	10	D	E	15	D	E
40. Perform sensitivity tests for allergic reactions to contrast media	80	D	A	35	D	E	20	E	E	10	D	E	5	0	0
41. Provide surgical assistance for radiologist	20	D	A	60	W	E	40	M	E	10	D	E	10	W	E
42. Assist with cardiac catheterization and angiocardiogram procedures	80	D	A	20	W	E	25	M	E	0	0	0	10	D	E
43. Assist with arthrograms	60	D	A	50	W	A	60	W	E	25	D	E	10	M	E
44. Assist with bronchiograms	60	D	A	40	W	E	30	M	A	25	D	E	10	D	E
45. Assist with cerebral angiograms	60	D	A	40	W	A	40	M	A	25	D	E	10	D	E

Table 2. Continued

Radiology Tasks	Group 1 Radiologist n = 5			Group 2 Chief Technologist n = 34			Group 3 Staff Technologist n=37			Group 4 Technical Support n=8			Group 5 Non-Technical Support n = 17		
	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.
46. Assist with gynecograms	40	D	A	25	M	E	15	W	A	0	0	0	5	M	E
47. Assist with hysterosalpingograms	100	M	A	55	W	E	65	M	E	10	D	E	15	W	E
48. Assist with cholangiograms	60	W	A	80	W	E	85	W	E	25	D	E	15	D	E
49. Assist with intravenous pyelograms (IVP's)	60	D	A	80	D	E	85	D	E	25	D	E	15	D	E
50. Assist with laminograms	60	D	A	55	D	E	65	D	A	25	D	E	10	W	E
51. Assist with macroradiograms.	20	W	E	5	M	A	0	0	0	0	0	0	5	0	0
52. Assist with mammograms	60	D	A	55	W	E	60	M	A	0	0	0	5	W	E
53. Assist with pneumocardiograms	40	M	A	20	M	E	0	0	0	0	0	0	10	M	E
54. Assist with pneumocystograms	40	M	A	20	M	E	5	W	A	0	0	0	10	M	E
55. Assist with pneumoencephalograms	20	W	A	45	W	E	45	M	A	25	0	0	10	W	E
56. Assist with urographic studies	60	D	A	70	W	A	65	W	E	0	0	0	15	D	E
57. Assist with scanograms	80	D	A	30	M	E	30	M	A	10	W	E	10	M	E
58. Assist with sialograms	40	D	A	50	M	A	45	M	A	25	W	E	15	M	E
59. Assist with stereoscopic X-rays	60	D	E	70	W	E	70	D	E	25	D	E	10	W	E
60. Assist with upper GI series	80	D	A	80	D	E	80	D	E	25	D	E	15	D	E

Table 2. Percentage of Respondents Performing Radiology Tasks and Reported Frequency and Difficulty of Performance by Occupational Category (N=101)
Continued

Radiology Tasks	Group 1 Radiologist n=5			Group 2 Chief Technologist n=34			Group 3 Staff Technologist n=37			Group 4 Technical Support n=8			Group 5 Non-Technical Support n=17		
	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.
61. Assist with ventriculograms	60	W	A	40	M	A	35	M	A	25	D	E	10	W	E
62. Assist with X-rays for cholecystographic studies	60	D	E	75	D	E	85	D	E	25	D	E	15	D	E
63. Assist with X-rays for contrast studies of esophagus	80	D	A	80	D	E	90	D	E	25	D	E	15	D	E
64. Assist with X-rays for contrast studies of large bowel or colon	60	D	E	80	D	E	90	D	E	25	D	E	15	D	E
65. Assist with X-rays for pelvimetric studies	80	W	A	80	D	E	85	W	E	25	D	E	15	D	E
66. Assist with X-rays of small intestine	60	D	E	80	D	E	90	D	E	25	D	E	15	D	E
67. Assist with fistula or sinus tract X-rays	40	W	A	70	W	A	80	M	E	25	D	E	15	M	E
68. Maintain automatic processing machines	40	D	E	65	D	E	40	D	E	35	D	E	10	W	E
69. Perform subtraction techniques	20	W	A	35	W	A	15	M	A	10	M	A	10	M	E
70. Operate automatic processing machines	40	D	E	70	D	E	80	D	E	60	D	E	15	D	E
71. Attach cones and filters for radiation therapy	20	M	H	15	D	A	25	D	E	0	0	0	5	0	0
72. Detect, identify, and measure radioisotopes in samples	40	D	A	15	W	A	15	D	A	0	0	0	0	0	0
73. Determine biological half-life of radioactive materials	60	D	E	10	D	A	15	D	E	0	0	0	0	0	0
74. Determine radiation level of cadavers prior to autopsy or release to mortuary	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75. Give instructions to patient prior to therapeutic administration of cobalt, roentgen or radium therapy	20	M	A	10	M	E	15	M	E	0	0	0	0	0	0

Table 2. Continued

Radiology Tasks	Group 1 Radiologist n = 5			Group 2 Chief Technologist n = 34			Group 3 Staff Technologist n=37			Group 4 Technical Support n=8			Group 5 Non-Technical Support n=17		
	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.
76. Load applicators for radium therapy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77. Maintain record of patient's blood count	0	0	0	10	D	E	0	0	0	0	0	0	0	0	0
78. Monitor patient's clothing, wastes, and bandages for radiation following treatment	0	0	0	20	M	A	5	W	A	0	0	0	0	0	0
79. Operate cobalt or super voltage therapy machines	0	0	0	10	D	A	10	D	A	0	0	0	0	0	0
80. Operate ortho-voltage equipment	20	D	E	5	D	E	0	0	0	0	0	0	5	0	0
81. Perform functional checks on radiation therapy equipment	0	0	0	10	M	A	0	0	0	0	0	0	0	0	0
82. Perform radioisotope therapy	60	W	E	5	W	A	10	W	A	0	0	0	0	0	0
83. Perform scan utilizing specialized electronic detectors	40	D	E	10	D	A	15	D	A	0	0	0	0	0	0
84. Operate low voltage roentgen therapy equipment	0	0	0	10	D	E	15	D	A	0	0	0	0	0	0
85. Operate betatron therapy equipment	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
86. Operate linear accelerator therapy equipment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87. Perform decontamination procedures	0	0	0	5	M	A	0	0	0	0	0	0	0	0	0
88. Dispose of radioactive materials	40	W	E	10	M	A	10	M	E	0	0	0	0	0	0
89. Take treatment and port films	20	W	E	20	D	A	20	D	E	0	0	0	0	0	0
90. Calibrate X-ray machines	0	0	0	20	M	E	10	M	E	0	0	0	5	W	H

Table 2. Percentage of Respondents Performing Radiology Tasks and Reported Frequency and Difficulty of Performance by Occupational Category (N=101)
Continued

Radiology Tasks	Group 1 Radiologist n=5			Group 2 Chief Technologist n=34			Group 3 Staff Technologist n=37			Group 4 Technical Support n=8			Group 5 Non-Technical Support n=17		
	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.
91. Make minor repairs or adjustments to X-ray machines	40	W	A	70	M	A	30	M	E	10	M	E	10	D	E
92. Replace and mount X-ray screesn	40	M	E	55	M	E	15	M	A	0	0	0	10	M	E
93. Test for screen film contact	40	M	E	70	M	E	35	M	E	25	D	E	10	W	E
94. Test for X-ray beam alignment	40	M	E	60	M	A	25	M	E	0	0	0	10	W	E

B. Clerical Tasks

The eighteen tasks listed in this category summarize the paperwork and clerical activities performed in a Radiology Department (see Table 3, page 31.)

PERFORMANCE

The two occupational groups most actively involved in the performance of these tasks were the Chief Technologists and the Non-Technical Support Group. Nine of the tasks were performed by 50 percent or more of the Chief Technologists, while the Non-Technical Support personnel reported six of the tasks at the 50 percent level of performance. The remaining three occupational groups were much less active in this area. Using 50 percent performance as a cutoff, the Staff Technologists performed only three of the tasks and the Radiologists and Technical Support Personnel did not perform any of the tasks.

The Radiologists, as mentioned above, were relatively uninvolved in the performance of these tasks. Two of the tasks, Task No. 101, "Maintain blank forms for management control," and Task No. 112, "Maintain blood count records on radiology personnel," were not performed by them at all. The Chief Technologists, in contrast, indicated at least some involvement in all of the tasks. The task most typically performed by this group, Task No. 109, "Prepare and submit supply requests," was performed by 70 percent of the respondents. The Staff Technologists indicated involvement in all but three of the tasks. Task No. 97, "Assemble, index, and

file X-ray films," was reported as being performed by 70 percent of the Staff Technologists.

None of the Technical Support personnel performed six of the tasks in this category. Task No. 109, "Prepare and submit supply requests," at 35 percent performance, was the most frequently performed task for these respondents. The Non-Technical Support personnel were, as might be expected, significantly involved in a number of these tasks. They indicated the highest performance on Tasks No. 96, "Type correspondence," No. 99, "Process loans of X-ray films," and No. 98, "Forward X-ray reports to physician," the latter task being performed by 85 percent of the respondents.

FREQUENCY

Each of the five groups indicated that the mode frequency of performance was Daily, for most of the tasks. A few of the tasks were done at least once a day by all of the groups; for example, Task No. 98, "Forward X-ray reports to physician." Other tasks, such as Task No. 111, "Issue and collect film badges or other radiation detectors," and Task No. 112, "Maintain blood count records on radiology personnel," were performed once a month or less often.

DIFFICULTY

Almost without exception, the tasks in this functional area were considered to be Easy to perform. There were only two instances in which a task was rated to be of Average difficulty, and in each case the number of respondents involved was too small to be suggestive of a significant trend.

Table 3. Percentage of Respondents Performing Clerical Tasks and Reported Frequency and Difficulty of Performance by Occupational Category

B. Clerical Tasks	Group 1 Radiologist n = 5			Group 2 Chief Technologist n = 34			Group 3 Staff Technologist n=37			Group 4 Technical Support n=8			Group 5 Non-Technical Support n=17		
	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.
95. Prepare and maintain index file	40	D	E	55	D	E	60	D	E	10	D	E	55	D	E
96. Type correspondence	40	D	E	35	D	E	15	M	E	25	D	E	75	D	E
97. Assemble, index, and file X-ray films	40	D	E	60	D	E	70	D	E	10	W	E	65	D	E
98. Forward X-ray reports to physician	40	D	E	60	D	E	45	D	E	25	D	E	85	D	E
99. Process loans of X-ray films	40	D	E	55	D	E	60	D	E	25	D	E	70	D	E
100. Review, retire, or dispose of films and X-ray indexes	40	D	E	65	D	E	30	M	E	10	W	A	25	M	E
101. Maintain blank forms for management control	0	0	0	10	D	E	0	0	0	0	0	0	15	D	E
102. Maintain files of correspondence	40	D	E	45	D	E	15	D	E	10	M	E	50	D	E
103. Maintain operating file of regulations, instructions, and/or policies	40	D	E	50	M	E	5	D	E	25	M	E	20	D	E
104. Maintain publications reference files	20	D	E	30	M	E	0	0	0	0	0	0	15	M	E
105. Maintain radiologic diagnostic index	20	D	E	40	D	E	5	D	E	10	M	E	20	D	E
106. Maintain radiology work record for statistical purposes	20	D	E	60	D	E	25	D	E	0	0	0	25	D	E
107. Keep accounts	20	D	E	20	D	E	5	D	E	0	0	0	20	D	E
108. Prepare financial statements	20	W	A	15	D	E	0	0	0	0	0	0	20	M	E
109. Prepare and submit supply requests	20	D	E	70	D	E	15	M	E	35	W	E	45	W	E

Table 3. Percentage of Respondents Performing Clerical Tasks and Reported Frequency and Difficulty of Performance by Occupational Category
Continued

Clerical Tasks	Group 1 Radiologist n = 5			Group 2 Chief Technologist n = 34			Group 3 Staff Technologist n=37			Group 4 Technical Support n=8			Group 5 Non-Technical Support n = 17		
	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.
110. Prepare statements for patient billing	20	D	E	30	D	E	15	D	E	10	D	E	15	D	E
111. Issue and collect film badges or other radiation detectors	40	M	E	60	M	E	25	M	E	10	M	E	10	W	E
112. Maintain blood count records on radiology personnel	0	0	0	40	M	E	10	M	E	0	0	0	10	M	E

C. ADMINISTRATIVE FUNCTIONS

The 55 tasks enumerated in this functional area are concerned with the supervision and maintenance of the Radiology Department. Listed in this category are tasks related to the coordination of the departmental procedures, the maintenance of the physical environment in the department, and the training and supervision of employees. Analysis of response appears in Table 4, page 36.

PERFORMANCE

The tasks in this category were almost exclusively the domain of the Radiologists and the Chief Technologists. Of the remaining three groups, the Non-Technical Support group was the most active; no more than 25 percent of these employees, however, reported performing any of these tasks.

The Radiologists were most active in tasks that specified the implementation of departmental procedures and the supervision of employees. For example, 80 percent of the Radiologist respondents performed Tasks No. 116, "Coordinate radiology activities with hospital administration," and No. 142, "Investigate reports of unusual incidents." Similarly, tasks related to the evaluation and supervision of employees were often performed at the 80 percent level, e.g., Tasks No. 136, "Interview and evaluate prospective employees," and No. 140, "Supervise technical staff." Several tasks, in contrast, were not performed by any of the Radiologists. Most of these tasks, No. 150-153, were primarily focused on the planning and operation of a training program for staff employees.

The Chief Technologists were most actively involved in areas related to the supervision of subordinate workers in the Radiology Department. The two tasks which were performed by 80 percent or more of these respondents were Task No. 127, "Schedule work assignments," and No. 160, "Maintain on-call roster of doctors and/or technicians." In addition, the Chief Technologists tended to be more involved in the training and orientation of new employees than did the Radiologists. Seventy-five percent of the former group indicated they performed Task No. 148, "Orient newly assigned personnel," as opposed to only 40 percent of the latter group. An area in which the Chief Technologists appear to be less involved than the Radiologists is the planning and coordination of departmental administration. For instance, 60 percent of the Radiologists reported performance of Task No. 114, "Coordinate patient clinical management," as opposed to the Chief Technologists, who indicated 15 percent performance. Any conclusions based upon these findings are, however, only tentative, as the small size of the sample population precludes any final judgments.

FREQUENCY

The frequency ratings indicated by the Staff Technologists, Technical Support and Non-Technical Support groups were of little value, as the proportion of respondents performing these tasks at all was very small. A few comments are appropriate, however, for the remaining two groups. When both the Radiologists and Chief Technologists perform a task,

there appears to be a tendency for the Radiologists to do so with greater frequency. In only a few cases did the Chief Technologists perform a task more frequently than did the Radiologists.

DIFFICULTY

The Radiologists reported difficulty ratings for only 43 of the 55 tasks. Twenty-nine of these tasks were designated as Easy and 14 were reported to be of Average difficulty. The Chief Technologist showed a tendency to rate the tasks as being slightly more difficult than did the Radiologists. The Chief Technologists gave difficulty ratings for all the tasks, rating 22 as Easy, while 33 were reported to be of Average difficulty. Because only a small proportion of the respondents from the remaining three occupational groups were active in the performance of the administrative tasks, any conclusions based upon their difficulty ratings would be inappropriate.

Table 4. Percentage of Respondents Performing Administrative Tasks and Reported Frequency and Difficulty of Performance by Occupational Category

C. Administrative Tasks	Group 1 Radiologist n = 5			Group 2 Chief Technologist n = 34			Group 3 Staff Technologist n = 37			Group 4 Technical Support n = 8			Group 5 Non-Technical Support n = 17		
	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.
113. Coordinate communicable disease investigation	0	0	0	10	D	E	0	0	0	0	0	0	0	0	0
114. Coordinate patient clinical management	60	D	E	15	D	E	0	0	0	0	0	0	0	0	0
115. Develop procedures for data processing	20	D	0	20	M	A	0	0	0	0	0	0	10	M	A
116. Coordinate radiology activities with hospital administration	80	D	A	55	W	A	0	0	0	0	0	0	10	W	E
117. Plan emergency evacuation of patients, establish emergency priorities	60	M	A	50	M	E	15	M	E	0	0	0	5	M	E
118. Coordinate work functions of volunteers, (hours, patient handling)	20	0	0	25	M	E	0	0	0	0	0	0	10	M	E
119. Coordinate physical plant work orders or requests	20	0	0	45	W	A	0	0	0	0	0	0	10	D	E
120. Develop technical procedures for special radiology examinations	60	M	A	55	W	A	25	M	A	0	0	0	10	D	A
121. Develop organizational functional charts	20	0	0	35	M	A	0	0	0	0	0	0	10	M	E
122. Work up budget estimates and justification	60	W	A	35	M	A	0	0	0	0	0	0	10	M	A
123. Establish and direct administrative operating policies, procedures and regulations	40	W	A	45	D	A	0	0	0	0	0	0	10	D	A
124. Direct and maintain quality control functions	60	D	E	65	D	A	5	D	E	0	0	0	10	D	E
125. Modify work methods and procedures	60	W	E	70	W	A	10	D	E	0	0	0	15	D	A
126. Develop and prepare cost analysis data	20	W	A	15	M	A	0	0	0	0	0	0	5	D	A
127. Schedule work assignments	40	W	E	85	W	A	15	W	E	0	0	0	15	D	A

Table 4. Continued

Administrative Tasks	Group 1 Radiologist n=5			Group 2 Chief Technologist n=34			Group 3 Staff Technologist n=37			Group 4 Technical Support n=8			Group 5 Non-Technical Support n=17		
	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.
128. Plan or modify radiology facilities' physical layout, space assignment	60	D	A	40	M	A	0	0	0	0	0	0	10	W	A
129. Plan and direct the maintenance and distribution of patient reports, records, and departmental records, and correspondence	60	D	E	45	D	A	0	0	0	0	0	0	25	D	E
130. Direct patient care procedures	40	D	E	50	D	E	0	0	0	0	0	0	5	0	0
131. a. Diagnostic	80	D	E	60	D	E	10	D	E	0	0	0	5	0	0
132. b. Therapeutic	20	W	A	10	D	E	0	0	0	0	0	0	0	0	0
133. c. Nuclear medicine	80	D	A	15	D	A	0	0	0	0	0	0	5	0	0
134. Direct personnel in compliance with radiation safety regulations	80	D	E	65	D	A	5	D	E	0	0	0	10	M	A
135. Prepare and submit job descriptions	40	W	A	60	M	A	0	0	0	0	0	0	15	M	A
136. Interview and evaluate prospective employees	80	W	E	60	M	A	0	0	0	0	0	0	15	M	A
137. Resolve staff complaints	60	W	E	70	W	A	0	0	0	0	0	0	15	D	A
138. Resolve technical problesm	60	D	E	75	D	A	5	W	A	0	0	0	10	D	E
139. Develop and schedule contract preventive maintenance programs	20	W	A	50	W	A	0	0	0	0	0	0	5	M	E
140. Supervise technical staff	80	D	E	75	D	A	15	W	E	0	0	0	10	D	E
141. Supervise clerical staff	80	D	E	60	D	A	0	0	0	0	0	0	15	D	E
142. Investigate reports of unusual incidents	80	M	E	75	W	A	5	W	A	0	0	0	10	M	E

Table 4. Percentage of Respondents Performing Administrative Tasks and Reported Frequency and Difficulty of Performance by Occupational Category

Administrative Tasks	Group 1 Radiologist n=5			Group 2 Chief Technologist n=34			Group 3 Staff Technologist n=37			Group 4 Technical Support n=8			Group 5 Non-Technical Support n=17		
	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.
143. Serve on employee relations boards	20	W	A	30	M	E	0	0	0	0	0	0	15	M	E
144. Arrange for training aids, space, and equipment	40	W	E	30	M	E	5	W	E	0	0	0	10	M	E
145. Conduct formal classroom instruction	40	W	A	35	W	A	0	0	0	0	0	0	15	D	E
146. Conduct on-the-job training	60	D	E	70	D	A	20	D	A	0	0	0	15	M	E
147. Prepare employee ratings and counsel individuals in progression and career development	40	M	E	50	M	E	0	0	0	0	0	0	10	W	A
148. Orient newly assigned personnel	40	D	E	75	M	E	15	M	E	10	M	A	15	M	E
149. Maintain and review student training records	20	M	E	30	M	A	5	D	E	0	0	0	10	D	E
150. Plan, schedule, and evaluate training programs	0	0	0	30	W	A	5	D	E	10	M	E	10	W	A
151. Prepare, administer, and score tests	0	0	0	20	W	A	0	0	0	0	0	0	15	M	E
152. Evaluate instructors	0	0	0	15	M	A	0	0	0	0	0	0	10	M	E
153. Select and assign instructors	0	0	0	15	M	A	0	0	0	0	0	0	10	M	E
154. Supervise training program	20	D	0	30	D	A	10	D	E	0	0	0	10	0	0
155. Recruit trainees	20	D	0	20	M	A	0	0	0	10	M	A	10	M	0
156. Undertake placement activities	0	0	0	5	M	E	0	0	0	0	0	0	10	M	E
157. Originate correspondence	40	D	E	25	W	E	0	0	0	0	0	0	25	D	E

Table 4. Continued

Administrative Tasks	Group 1 Radiologist n = 5			Group 2 Chief Technologist n = 34			Group 3 Staff Technologist n = 37			Group 4 Technical Support n = 8			Group 5 Non-Technical Support n = 17		
	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.
158. Prepare special orders on assignment, re-assignment, or transfer of patients	20	D	E	35	D	E	0	0	0	0	0	0	5	D	0
159. Establish an inventory system for supplies, equipment, and material	20	M	E	60	M	E	0	0	0	0	0	0	10	M	A
160. Maintain on-call roster of doctors and/or technicians	80	W	E	80	W	E	0	0	0	0	0	0	10	W	A
161. Maintain personnel file	40	W	E	55	M	E	0	0	0	0	0	0	10	W	0
162. Initiate authorization forms for examinations of minors or mental incompetents	20	D	E	10	W	A	0	0	0	0	0	0	0	0	0
163. Initiate authorization of forms for administration of anesthesia or for performing operations	20	D	E	10	M	E	0	0	0	0	0	0	0	0	0
164. Prepare patient examination schedule	40	D	E	60	D	E	10	D	A	0	0	0	15	D	E
165. Develop patient instruction forms for radiologic examinations	60	M	A	55	M	E	0	0	0	0	0	0	10	M	A
166. Prepare vacation schedule	60	M	E	65	M	E	0	0	0	0	0	0	15	M	A
167. Prepare formal requests for radiation source changes	20	M	E	5	M	E	0	0	0	0	0	0	0	0	0

D. Research Tasks

The tasks in this functional area are predominantly research-oriented activities that might be performed in a research program at a teaching hospital affiliated with a major university. Analysis of response is given in Table 5.

FREQUENCY

As the survey sample population was composed mainly of hospitals without large scale research programs in operation, it is not surprising that the tasks in this functional area were outside the area of activities performed by the respondents. Many of these tasks, in fact, were performed by no more than one person from any of the occupational groups. Had the survey sample included respondents from hospitals affiliated with large universities, it is possible that the performance percentages for these tasks would have been much higher. As it stands now, the findings are of little use in differentiating the occupational groups in terms of the parameters employed by the study, i.e., performance, frequency, and difficulty.

Table 5. Percentage of Respondents Performing Research Tasks and Reported Frequency and Difficulty of Performance by Occupational Category

D. Research Tasks	Group 1 Radiologist n = 5			Group 2 Chief Technologist n = 34			Group 3 Staff Technologist n=37			Group 4 Technical Support n=8			Group 5 Non-Technical Support n = 17		
	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.
168. Analyze technical radiology research data	20	M	A	5	M	E	0	0	0	0	0	0	5	M	A
169. Assemble equipment for research	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170. Assist in designing radiology research	0	0	0	0	0	0	0	0	0	0	0	0	5	M	A
171. Assist in writing reports or technical papers for publications	20	M	H	0	0	0	0	0	0	0	0	0	5	M	A
172. Calculate dosages to be administered for prescribed procedures	20	0	0	10	D	A	10	D	E	0	0	0	0	0	0
173. Compile experimental data for reports	0	0	0	0	0	0	0	0	0	0	0	0	5	M	A
174. Coordinate experimental program design with statistician and external and internal agencies	0	0	0	0	0	0	0	0	0	0	0	0	5	M	A
175. Design and develop experimental devices or equipment	20	M	H	0	0	0	0	0	0	0	0	0	0	0	0
176. Design forms for maintaining radiology research data	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
177. Use radioactive sources in research	20	D	0	0	0	0	0	0	0	0	0	0	0	0	0

E. Miscellaneous Tasks

The eighteen tasks in this functional area cover a variety of different activities. Response is presented in Table 6, page 44.

PERFORMANCE

Several of the tasks in this section rate special attention. Task No. 178, "Assist patients to or from litters or wheelchairs," was performed by 95 percent of the Staff Technologists and 85 percent of the Chief Technicians. The remaining groups were involved in the performance of this task to a lesser extent; however, at least one person from each of the groups indicated that it was a part of his job. Because an employee may easily injure himself by applying improper body mechanics when assisting patients to and from wheelchairs, it seems reasonable that curriculum for all employees working in the Radiology Department should offer basic instruction in body mechanics.[1]

The two groups most active in the performance of the tasks were the Chief Technologists and the Staff Technologists. Chief Technologists performed Tasks No. 183, "Maintain darkroom facilities and equipment." No. 191, "Maintain cassettes," and No. 194, "Transport patients," at or above the 70 percent mark. Staff Technologists performed three tasks at or above

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[1]This information is part of the nursing curriculum development at AHPP in all of the groups.

the 70 percent mark: No. 179, "Prepare patients for examinations," No. 189, "Store unexposed films," and No. 194, "Transport patients."

FREQUENCY

The mode frequency of performance was Daily for the majority of the miscellaneous tasks. Staff Technologists reported that they performed these tasks less often than did the other groups, indicating that they did five of the tasks only once a month or less.

DIFFICULTY

Almost without exception, the tasks in this section were rated Easy to perform.

Table 6. Percentage of Respondents Performing Miscellaneous Tasks and Reported Frequency and Difficulty of Performance by Occupational Category

E. Miscellaneous Tasks	Group 1 Radiologist n=5			Group 2 Chief Technologist n=34			Group 3 Staff Technologist n=37			Group 4 Technical Support n=8			Group 5 Non-Technical Support n=17		
	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.
178. Assist patients to or from litters or wheelchairs	40	D	E	85	D	E	95	D	E	25	D	E	15	D	E
179. Prepare patients for examinations	40	D	E	60	D	E	75	D	E	10	D	E	15	W	E
180. Give standard first-aid treatment	60	M	E	50	M	A	35	D	E	0	0	0	0	0	0
181. Sterilize equipment	40	D	E	30	D	E	15	D	E	10	D	E	5	D	E
182. Label and transfer specimens	20	D	E	35	D	E	40	W	E	10	D	E	5	D	E
183. Maintain darkroom facilities and equipment	40	D	E	80	D	E	50	D	E	35	D	E	10	D	E
184. Prepare processing solutions	40	D	E	55	W	E	35	M	E	25	D	E	10	W	E
185. Mount films in viewing apparatus	40	D	E	65	D	E	50	D	E	0	0	0	15	D	E
186. Replenish solutions	40	D	E	55	D	E	50	M	E	25	D	E	10	D	E
187. Reproduce X-ray films on 35 mm slides	0	0	0	5	D	E	0	0	0	10	D	E	10	D	E
188. Reproduce X-rays by direct duplication method, microfilm or microfiche	0	0	0	25	W	E	10	M	E	25	D	A	10	M	E
189. Store unexposed films	40	D	E	65	W	E	70	W	E	35	D	E	10	W	E
190. Maintain film hangers	0	0	0	35	W	E	25	W	E	0	0	0	10	D	E
191. Maintain cassettes	40	W	E	75	W	E	65	M	E	25	D	E	15	D	E
192. Change dressings	0	0	0	20	D	A	10	M	E	0	0	0	0	0	0

Table 6. Continued

Miscellaneous Tasks	Group 1 Radiologist n = 5			Group 2 Chief Technologist n = 34			Group 3 Staff Technologist n = 37			Group 4 Technical Support n = 8			Group 5 Non-Technical Support n = 17		
	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.	%	Freq.	Dif.
193. Wash and sterilize treatment facilities	20	D	E	40	D	E	25	D	E	10	D	E	5	D	E
194. Transport patients	40	D	E	80	D	E	70	D	E	50	D	E	15	D	E
195. Operate audio-visual aids	40	D	E	15	D	A	10	D	E	0	0	0	15	D	E

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FINDINGS AND IMPLICATIONS OF THE STUDY

Findings

Although the survey population was limited in size, the data may prove useful in elucidating a number of current practices and trends in the field of Hospital Radiology.

1. The survey results show a clear delineation of task performance among the different occupational groups included within the survey population.

   Radiologists: The Radiologists were most active in performing the Radiology and Administrative tasks.

   Chief Technologists: These respondents indicated extensive involvement in all of the functional areas covered in the survey questionnaires, with the exception of the Research tasks, which were generally not performed by any of the respondents.

   Staff Technologists: The respondents in this category reported that their main area of responsibility revolved around the performance of the Radiology tasks and the Miscellaneous tasks.

   Technical Support: This group was relatively inactive in the performance of the majority of the tasks covered in the survey. The two functional areas in which the respondents indicated the most activity were the Radiology tasks and the Miscellaneous tasks.

Non-Technical Support: These respondents indicated that their responsibilities centered around the performance of Clerical tasks.

Implications for Curriculum Development

The primary objective of the AHPP is to develop curricula and educational materials for the allied health occupations. The results of the present survey will guide the Project's efforts in attaining this goal. The survey tapped three separate but related areas of task performance: percentage of performance, frequency of performance, and difficulty of performance. Although each of these parameters offers valuable information and may be used by itself to suggest patterns and areas of emphasis in the development of curricula, the staff at AHPP decided to integrate the three indices of performance so as to produce a single and more readily applicable indicator of performance.

It was felt that the percentage of performance index was the most potent of the three performance parameters and should be given priority over the Frequency and Difficulty ratings. The Frequency rating appears to be an integral part of the performance pattern, however, and it was felt that tasks which are typically performed Daily should be given priority over those that are performed less frequently. Similarly, it was felt that tasks which received a mode difficulty rating of Average or Hard should be given precedence over tasks rated Easy. With these considerations in mind, the following code was formulated in order to facilitate both the reader's comprehension of the survey results, and the AHPP staff's efforts to set priorities for the development of curriculum.

1. R (Required) indicates that the corresponding task should be required in the development of curricula.

Tasks performed by 75 percent or more of the respondents in a given occupational category were automatically given an R coding. Also, tasks which were performed by 50 to 74 percent of the respondents were given an R coding when they were performed Daily and/or had a mode difficulty rating of Average or Hard.

2. S (Suggested) indicates that the corresponding task is suggested for inclusion in the forthcoming curricula. Tasks which were performed by 50 to 74 percent of the personnel with a frequency of less than Daily and received a mode difficulty rating of Easy were given an S coding. Also, tasks which were performed by 25 to 49 percent of the respondents were given an S coding when they were performed Daily and/or had a mode difficulty rating of Average or Hard.
3. LP (Low Priority) indicates that the corresponding task should receive relatively low priority with regard to the development of curriculum. Tasks performed by 25 to 49 percent of the respondents with a frequency of less than Daily and a mode difficulty rating of Easy were given the LP coding.
4. Q (Questionable) indicates that the corresponding task is of questionable relevance for curricula aimed at the occupational group concerned. All tasks performed by less than 25 percent of the respondents were given the Q coding.

These suggested code designations are related below to the tasks in the questionnaire for each of the occupational groups (Table 7). It should be stressed that the recommendations expressed here are drawn exclusively from the data as reported by the survey respondents. If the findings appear to be contradict expert opinion, or common sense, it must be remembered that the results of the survey are only one of several indices used in the development of curricula. The following recommendations are merely an empirical guide to be used where appropriate. Recommendations were not included for the Radiologists because the AHPP is not directing curricula to this category of personnel.

Table 7. Curriculum Recommendations Based Upon Analysis of Response to Questionnaire

A. Radiology Tasks	Chief Technologist	Staff Technologist	Technical Support	Non-Technical Support
1. Review patient's clinical history	R[1]	R	Q[2]	Q
2. Prepare trays for special examinations	R	S[3]	S	Q
3. Load and unload film units	R	R	R	Q
4. Use polaroid units	LP[4]	S	Q	Q
5. Position patients for treatment	S	R	S	Q
6. Prepare written radiology therapy instructions for patients	Q	Q	Q	Q
7. Store radioactive materials	LP	LP	Q	Q
8. Wash and sterilize treatment facilities	S	Q	Q	Q
9. Assist in treatment planning	Q	Q	Q	Q
10. Number cassettes or screens for identification	S	LP	R	Q
11. Select immobilization devices	R	R	Q	Q
12. Place patient in radiographic position	R	R	S	Q
13. Clean radiographic equipment	R	R	R	Q
14. Affix lead shield to cassette for identification	S	S	S	Q
15. Prepare contrast media such as barium sulphate	R	R	R	Q

[1]Recommended [2]Questionable [3]Suggested [4]Low Priority

Table 7. Continued

Radiology Tasks	Chief Technologist	Staff Technologist	Technical Support	Non-Technical Support
16. Administer radiopaque preparations	R	R	Q	Q
17. Determine and adjust control panel settings such as voltage, amperage, and time exposure	R	R	S	Q
18. Assist physician in special procedures	R	R	S	Q
19. Operate video tape equipment	Q	Q	S	Q
20. Load cameras for cinefluorography	Q	LP	Q	Q
21. Make catheters for special X-ray examinations	Q	Q	Q	Q
22. Operate autoclave	Q	Q	Q	Q
23. Process films in surgery	S	R	S	Q
24. Label and transfer specimens	LP	LP	Q	Q
25. Maintain silver recovery operation	LP	Q	Q	Q
26. Perform safety check for exposure safelights	S	Q	Q	Q
27. Test for scatter radiation	R	LP	Q	Q
28. Take dental X-rays	LP	S	Q	Q
29. Take abdominal X-rays	R	R	S	Q
30. Take spinal X-rays	R	R	S	Q

R=Recommended; Q=Questionable; S=Suggested; LP= Low Priority

Table 7. Curriculum Recommendations Based Upon Analysis of Response to Questionnaire
Continued

	Chief Technologist	Staff Technologist	Technical Support	Non-Technical Support
31. Take chest X-rays	R	R	S	Q
32. Take facial X-rays	R	R	S	Q
33. Take mastoid X-rays	R	R	S	Q
34. Take paranasal X-rays	R	R	S	Q
35. Take X-rays of extremities	R	R	S	Q
36. Take X-rays of ribs and sternum	R	R	S	Q
37. Operate cinefluorographic equipment	Q	Q	Q	Q
38. Operate image intensifier fluoroscopic units	R	R	S	Q
39. Operate mobile X-ray units	R	R	Q	Q
40. Perform sensitivity tests for allergic reactions to contrast media	S	Q	Q	Q
41. Provide surgical assistance for radiologist	S	LP	Q	Q
42. Assist with cardiac catheterization and angiocardiogram procedures	Q	LP	Q	Q
43. Assist with arthrograms	R	S	S	Q
44. Assist with bronchiograms	LP	S	S	Q
45. Assist with cerebral angiograms	S	S	S	Q

R=Recommended; Q=Questionable; S=Suggested; LP=Low Priority

Table 7. Continued

Radiology Tasks	Chief Technologist	Staff Technologist	Technical Support	Non-Technical Support
46. Assist with gynecograms	LP	Q	Q	Q
47. Assist with hysterosalpingograms	S	S	Q	Q
48. Assist with cholangiograms	R	R	S	Q
49. Assist with intravenous pyelograms (IVP's)	R	R	S	Q
50. Assist with laminograms	R	R	S	Q
51. Assist with macroradiograms	Q	Q	Q	Q
52. Assist with mammograms	S	R	Q	Q
53. Assist with pneumocardiograms	Q	Q	Q	Q
54. Assist with pneumocystograms	Q	Q	Q	Q
55. Assist with pneumoencephalograms	LP	S	LP	Q
56. Assist with urographic studies	R	S	Q	Q
57. Assist with scanograms	LP	S	Q	Q
58. Assist with sialograms	R	S	LP	Q
59. Assist with stereoscopic X-rays	S	R	S	Q
60. Assist with upper GI series	R	R	S	Q

R=Recommended; Q=Questionable; S=Suggested; LP=Low Priority

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Table 7. Curriculum Recommendations Based Upon Analysis of Response to Questionnaire
Continued

Radiology Tasks	Chief Technologist	Staff Technologist	Technical Support	Non-Technical Support
61. Assist with ventricueograms	S	S	S	Q
62. Assist with X-rays for cholecystographic studies	R	R	S	Q
63. Assist with X-rays for contrast studies of esophagus	R	R	S	Q
64. Assist with X-rays for contrast studies of large bowel or colon	R	R	S	Q
65. Assist with X-rays for pelvimetric studies	R	R	S	Q
66. Assist with X-rays of small intestine	R	R	S	Q
67. Assist with fistula or sinus tract X-rays	R	R	S	Q
68. Maintain automatic processing machines	R	S	S	Q
69. Perform subtraction techniques	S	Q	Q	Q
70. Operate automatic processing machines	R	R	R	Q
71. Attach cones and filters for radiation therapy	Q	S	Q	Q
72. Detect, identify, and measure radioisotopes in samples	Q	Q	Q	Q
73. Determine biological half-life of radioactive materials	Q	Q	Q	Q
74. Determine radiation level of cadavers prior to autopsy or release to mortuary	Q	Q	Q	Q
75. Give instructions to patient prior to therapeutic administration of of cobalt, roentgen or radium	Q	Q	Q	Q

R=Recommended; Q=Questionable; S=Suggested; LP=Low Priority

Table 7. Continued

Radiology Tasks	Chief Technologist	Staff Technologist	Technical Support	Non-Technical Support
76. Load applicators for radium therapy	Q	Q	Q	Q
77. Maintain record of patient's blood count	Q	Q	Q	Q
78. Monitor patient's clothing, wastes, and bandages for radiation following treatment	Q	Q	Q	Q
79. Operate cobalt or super voltage therapy machines	Q	Q	Q	Q
80. Operate ortho-voltage equipment	Q	Q	Q	Q
81. Perform functional checks on radiation therapy equipment	Q	Q	Q	Q
82. Perform radioisotope therapy	Q	Q	Q	Q
83. Perform scan utilizing specialized electronic detectors	Q	Q	Q	Q
84. Operate low voltage roentgen therapy equipment	Q	Q	Q	Q
85. Operate betatron therapy equipment	Q	Q	Q	Q
86. Operate linear accelerator therapy equipment	Q	Q	Q	Q
87. Perform decontamination procedures	Q	Q	Q	Q
88. Dispose of radioactive materials	Q	Q	Q	Q
89. Take treatment and port films	Q	Q	Q	Q
90. Calibrate X-ray machines	Q	Q	Q	Q

R=Recommended; Q=Questionable; S=Suggested; LP=Low Priority

Table 7. Curriculum Recommendations Based Upon Analysis of Response to Questionnaire
Continued

Radiology Tasks	Chief Technologist	Staff Technologist	Technical Support	Non-Technical Support
91. Make minor repairs or adjustments to X-ray machine	R	LP	Q	Q
92. Replace and mount X-ray screens	S	Q	Q	Q
93. Test for screen film contact	S	LP	S	Q
94. Test for X-ray beam alignment	R	LP	Q	Q

R=Recommended; Q=Questionable; S=Suggested; LP=Low Priority

Table 7. Continued

B. Clerical Tasks	Chief Technologist	Staff Technologist	Technical Support	Non-Technical Support
95. Prepare and maintain index file	R	R	Q	R
96. Type correspondence	S	Q	S	R
97. Assemble, index, and file X-ray films	R	R	Q	[illegible]
98. Forward X-ray reports to physician	R	S	S	R
99. Process loans of X-ray films	R	R	S	R
100. Review, retire, or dispose of films and X-ray indexes	R	LP	Q	LP
101. Maintain blank forms for management control	Q	Q	Q	Q
102. Maintain files of correspondence	S	Q	Q	R
103. Maintain operating file of regulations, instructions, and/or policies	S	Q	LP	Q
104. Maintain publications reference files	LP	Q	Q	Q
105. Maintain radiologic diagnostic index	S	Q	Q	Q
106. Maintain radiology work record for statistical purposes	R	S	Q	S
107. Keep accounts	Q	Q	Q	Q
108. Prepare financial statements	Q	Q	Q	Q
109. Prepare and submit supply requests	R	Q	LP	LP

R=Recommended; Q=Questionable; S=Suggested; LP=Low Priority

Table 7. Curriculum Recommendations Based Upon Analysis of Response to Questionnaire
Continued

Clerical Tasks	Chief Technologist	Staff Technologist	Technical Support	Non-Technical Support
110. Prepare statements for patient billing	S	Q	Q	Q
111. Issue and collect film badges or other radiation detectors	S	LP	Q	Q
112. Maintain blood count records on radiology personnel	LP	Q	Q	Q

R=Recommended; Q=Questionable; S=Suggested; LP=Low Priority

Table 7. Continued

C. Administrative Tasks	Chief Technologist	Staff Technologist	Technical Support	Non-Technical Support
113. Coordinate communicable disease investigation	Q	Q	Q	Q
114. Coordinate patient clinical management	Q	Q	Q	Q
115. Develop procedures for data processing	Q	Q	Q	Q
116. Coordinate radiology activities with hospital administration	R	Q	Q	Q
117. Plan emergency evacuation of patients, establish emergency priorities	S	Q	Q	Q
118. Coordinate work functions of volunteers, (hours, patient handling)	LP	Q	Q	Q
119. Coordinate physical plant work orders or requests	S	Q	Q	Q
120. Develop technical procedures for special radiology examinations	R	S	Q	Q
121. Develop organizational functional charts	S	Q	Q	Q
122. Work up budget estimates and justification	S	Q	Q	Q
123. Establish and direct administrative operating policies, procedures and regulations	S	Q	Q	Q
124. Direct and maintain quality control functions	R	Q	Q	Q
125. Modify work methods and procedures	R	Q	Q	Q
126. Develop and prepare cost analysis data	Q	Q	Q	Q
127. Schedule work assignments	R	Q	Q	Q

R=Recommended; Q=Questionable; S=Suggested; LP=Low Priority

Table 7. Curriculum Recommendations Based Upon Analysis of Response to Questionnaire
Continued

Administrative Tasks	Chief Technologist	Staff Technologist	Technical Support	Non-Technical Support
128. Plan or modify radiology facilities' physical layout, space assignment	S	Q	Q	Q
129. Plan and direct the maintenance and distribution of patient reports, records, and departmental records, and correspondence	S	Q	Q	S
130. Direct patient care procedures	R	Q	Q	Q
131. a. Diagnostic	R	Q	Q	Q
132. b. Therapeutic	Q	Q	Q	Q
133. c. Nuclear Medicine	Q	Q	Q	Q
134. Direct personnel in compliance with radiation safety regulations	R	Q	Q	Q
135. Prepare and submit job descriptions	R	Q	Q	Q
136. Interview and evaluate prospective employees	R	Q	Q	Q
137. Resolve staff complaints	R	Q	Q	Q
138. Resolve technical problems	R	Q	Q	Q
139. Develop and schedule contract preventive maintenance programs	R	Q	Q	Q
140. Supervise technical staff	R	Q	Q	Q
141. Supervise clerical staff	R	Q	Q	Q
142. Investigate reports of unusual incidents	R	Q	Q	Q

R=Recommended; Q=Questionable; S=Suggested; LP=Low Priority

Table 7. Continued

	Chief Technologist	Staff Technologist	Technical Support	Non-Technical Support
143. Serve on employee relations boards	LP	Q	Q	Q
144. Arrange for training aids, space, and equipment	LP	Q	Q	Q
145. Conduct formal classroom instruction	S	Q	Q	Q
146. Conduct on-the-job training	R	Q	Q	Q
147. Prepare employee ratings and counsel individuals in progression and career development	S	Q	Q	Q
148. Orient newly assigned personnel	R	Q	Q	Q
149. Maintain and review student training records	S	Q	Q	Q
150. Plan, schedule, and evaluate training programs	S	Q	Q	Q
151. Prepare, administer, and score tests	Q	Q	Q	Q
152. Evaluate instructors	Q	Q	Q	Q
153. Select and assign instructors	Q	Q	Q	Q
154. Supervise training program	S	Q	Q	Q
155. Recruit trainees	Q	Q	Q	Q
156. Undertake placement activities	Q	Q	Q	Q
157. Originate correspondence.	LP	Q	Q	S

R=Recommended; Q=Questionable; S=Suggested; LP=Low Priority

Table 7. Curriculum Recommendations Based Upon Analysis of Response to Questionnaire
Continued

Administrative Tasks	Chief Technologist	Staff Technologist	Technical Support	Non-Technical Support
158. Prepare special orders on assignment, reassignment, or transfer of patients	S	Q	Q	Q
159. Establish an inventory system for supplies, equipment, and material	S	Q	Q	Q
160. Maintain on-call roster of doctors and/or technicians	R	Q	Q	Q
161. Maintain personnel file	S	Q	Q	Q
162. Initiate authorization forms for examinations of minors or mental incompetents	Q	Q	Q	Q
163. Initiate authorization of forms for administration of anesthesia or for performing operations	Q	Q	Q	Q
164. Prepare patient examination schedule	R	Q	Q	Q
165. Develop patient instruction forms for radiologic examinations	S	Q	Q	Q
166. Prepare vacation schedule	S	Q	Q	Q
167. Prepare formal requests for radiation source changes	Q	Q	Q	Q

R=Recommended; Q=Questionable; S=Suggested; LP=Low Priority

Table 7. Continued

D. Research Tasks	Chief Technologist	Staff Technologist	Technical Support	Non-Technical Support
168. Analyze technical radiology research data	Q	Q	Q	Q
169. Assemble equipment for research	Q	Q	Q	Q
170. Assist in designing radiology research	Q	Q	Q	Q
171. Assist in writing reports or technical papers for publications	Q	Q	Q	Q
172. Calculate dosages to be administered for prescribed procedures	Q	Q	Q	Q
173. Compile experimental data for reports	Q	Q	Q	Q
174. Coordinate experimental program design with statistician and external and internal agencies	Q	Q	Q	Q
175. Design and develop experimental devices or equipment	Q	Q	Q	Q
176. Design forms for maintaining radiology research data	Q	Q	Q	Q
177. Use radioactive sources in research	Q	Q	Q	Q

R=Recommended; Q=Questionable; S=Suggested; LP=Low Priority

Table 7. Curriculum Recommendations Based Upon Analysis of Response to Questionnaire Continued

E. Miscellaneous Tasks	Chief Technologist	Staff Technologist	Technical Support	Non-Technical Support
178. Assist patients to or from litters or wheelchairs	R	R	S	Q
179. Prepare patients for examinations	R	R	Q	Q
180. Give standard first-aid treatment	R	S	Q	Q
181. Sterilize equipment	S	Q	Q	Q
182. Label and transfer specimens	S	LP	Q	Q
183. Maintain darkroom facilities and equipment	R	R	S	Q
184. Prepare processing solutions	S	LP	S	Q
185. Mount films in viewing apparatus	R	R	Q	Q
186. Replenish solutions	R	S	S	Q
187. Reproduce X-ray films on 35 mm slides	Q	Q	Q	Q
188. Reproduce X-rays by direct duplication method, microfilm or microfiche	LP	Q	S	Q
189. Store unexposed films	S	S	S	Q
190. Maintain film hangers	LP	LP	Q	Q
191. Maintain cassettes	R	S	S	Q
192. Change dressings	Q	Q	Q	Q

R=Recommended; Q=Questionable; S=Suggested; LP=Low Priority

Table 7. Continued

	Chief Technologist	Staff Technologist	Technical Support	Non-Technical Support
193. Wash and sterilize treatment facilities	S	S	Q	Q
194. Transport patients	R	R	R	Q
195. Operate audio-visual aids	Q	Q	Q	Q

R=Recommended; Q=Questionable; S=Suggested; LP=Low Priority

APPENDIX I

SURVEY DIRECTIONS

Read each task statement in the list. If you perform the task in your job, place a check mark in the first column after the statement. If you supervise performance of the task by other persons, place a check mark in the second column.

For each task that you perform (and have checked in the first column), place an X mark in one of the squares of the Frequency column and in one of the squares of the Difficulty column to indicate your answers to the following questions:

A. Frequency: How often do you perform this task?

1. Several times a day
2. Once a day or several times a week
3. Once a week or several times a month
4. Once a month or less often

B. Difficulty: How difficult is this task?

1. Easy: You follow a standard procedure that does not require any decisions; you never have to consult a procedure manual or a supervisor.

2. Moderate: You have to select the most suitable procedures to fit different conditions or situations; you sometimes have to consult a procedure manual or a supervisor.

3. Difficult: You encounter problems that may require changes in procedures or the use of new procedures; you usually have to consult a procedure manual or a supervisor.

BACKGROUND INFORMATION SHEET

ID number_____

Please complete this information sheet and return it with the survey form. The answers to these questions are of importance as we try to evaluate responses from a large number of people across the United States where educational and licensure requirements for specific jobs may be very different.

THIS IS A CONFIDENTIAL DOCUMENT IDENTIFIED BY NUMBER ONLY.

THIS INFORMATION WILL BE USED FOR RESEARCH PURPOSES ONLY.

1. Your position title_____

2. Department_____

3. Your major area of responsibility_____

4. Years in present position_____

5. Years in occupation_____

6. Previous occupation_____

7. Years in previous occupation_____

8. Age_____

9. Sex (circle) M F

10. Highest school grade completed (circle one)

less than 8	8	9	10	11	12	more than 12

(Continued on next page)

11. Highest academic level completed (circle one)

11.1 Less than high school diploma

11.2 High school diploma or equivalent

11.3 Some college (no degree)

11.4 Associate degree

11.5 Bachelor's degree (major) _____

11.6 Master's degree (major) _____

11.7 Other (specify) _____

12. Technical or other training program(s) completed (circle)

	Months	Area or Subject
12.1 None		
12.2 On-job or apprenticeship	_____	_____
12.3 Military courses	_____	_____
12.4 Manufacturers' courses	_____	_____
12.5 Vocational school	_____	_____
12.6 Certificate or diploma program	_____	_____
12.7 Other courses	_____	_____
	_____	_____

13. Certificates, licenses or registrations held

(specify)_____

14. Are you employed full time in your present position? (circle) YES NO

15. Present yearly hospital salary (circle one)

14.1 less than $2000

14.2 $2000 - 3999

14.3 $4000 - 5999

14.4 $6000 - 7999

14.5 $8000 - 9999

14.6 $10000 - 11999

14.7 $12000 - 15000

14.8 more than $15000

Step one: Read all tasks on this page, check those tasks which you perform or supervise.

Step two: For those tasks checked in step one, indicate with an "X" the frequency and difficulty of performance.

0012

Blank spaces are for other tasks that you perform or supervise.

A. Radiology Tasks

	Check if you perform this task	Check if you supervise the performance of this task	FREQUENCY ☒ How often do you perform this task? Several times a day	Once a day or several times a week	Once a week or several times a month	Once a month or less	DIFFICULTY ☒ How difficult is this task? Easy	Moderate	Difficult
1. Review patient's clinical history.	☐	☐	1	2	3	4	1	2	3
2. Prepare trays for special examinations.	☐	☐	1	2	3	4	1	2	3
3. Load and unload film units.	☐	☐	1	2	3	4	1	2	3
4. Use polaroid units	☐	☐	1	2	3	4	1	2	3
5. Position patients for treatment.	☐	☐	1	2	3	4	1	2	3
6. Prepare written radiology therapy instructions for patients.	☐	☐	1	2	3	4	1	2	3
7. Store radioactive materials.	☐	☐	1	2	3	4	1	2	3
8. Wash and sterilize treatment facilities.	☐	☐	1	2	3	4	1	2	3
9. Assist in treatment planning.	☐	☐	1	2	3	4	1	2	3
10. Number cassettes or screens for identification.	☐	☐	1	2	3	4	1	2	3
11. Select immobilization devices.	☐	☐	1	2	3	4	1	2	3
12. Place patient in radiographic position.	☐	☐	1	2	3	4	1	2	3
13. Clean radiographic equipment.	☐	☐	1	2	3	4	1	2	3
14. Affix lead shield to casserte for identification.	☐	☐	1	2	3	4	1	2	3
15. Prepare contrast media such as barium sulphate.	☐	☐	1	2	3	4	1	2	3

APPENDIX II

HEALTH CARE FACILITIES SELECTED
FOR NATIONAL SAMPLE

Birmingham

200 Beds or more

Baroness Erlanger Hospital	261 Wiehl Street Chattanooga, Tenn.	Harold L. Peterson Administrator Walter Haddock Survey Liaison
Baptist Medical Center	800 Montclaire Road Birmingham, Ala.	Duane T. Houtz Administrator Survey Liaison

100-199 Beds

Jeff Anderson Memorial Hospital	2124 - 14th Street Meridian, Miss.	Rueben S. Johnson President Mr. Mallette Personnel Director Survey Liaison
St. Judes Catholic Hospital	2018 W. Fairview Ave. Montgomery, Ala.	Sister M. Evangelista Administrator Survey Liaison

Under 100 Beds

Sam Howell Memorial Hospital	P.O. Box 508 Cartersville, Georgia	James Floyd Administrator Survey Liaison
Athens-Limestone Hospital	105 Sanders Street Athens, Alabama	Kenneth G. Hawthorne Administrator Mr. Huffon Survey Liaison

Extended-Care Facilities

Plantation Manor	P.O. Box 97 McCalla, Ala.	Mrs. Carmelita Lee Administrator Survey Liaison
St. Lukes Nursing Home	1220 S. 17th St. Birmingham, Ala.	Mr. Lierly Administrator Mr. Robbie Smith Survey Liaison

Boston

200 Beds or more

Peter Bent Brigham Hospital	721 Huntington Avenue Boston, Mass.	Mrs. Karen Nierenberg Personnel Director Survey Liaison
Memorial Hospital	119 Belmont Street Worcester, Mass.	David A. Barrett Administrator Jeffery Hunter Project Coordinator Survey Liaison

100-199 Beds

Faulkner Hospital	1153 Centre Street Boston, Mass.	William J. Skerry Director James V. Kerrigan Survey Liaison
Thayer Hospital	North Street Waterville, Maine	Pearl R. Fisher, RN Administrator Survey Liaison

Under 100 Beds

Mary Lane Hospital	85 South Street Ware, Mass.	Owen F. Connolly Administrator Survey Liaison
Falmouth Hospital	Ter Heun Drive Falmouth, Mass.	Gerald F. Flynn Administrator Survey Liaison

Extended-Care Facilities

Hebrew Rehabiliation Center for Aged	1200 Centre Street Boston, Mass.	Maurice I. May Administrator Mr. Lawrence Levinson Survey Liaison
Cambridge Nursing Home	1 Russell Street Cambridge, Mass.	Mr. Sidney Neustadt Administrator Survey Liaison

Chicago

200 Beds or more

Chicago Wesley Memorial Hospital	250 E. Superior Street Chicago, Illinois	Kenneth Hartman Superintendent Miss Anne Blanton Asst. Administratcr Survey Liaison
Kenosha Memorial	6308 - 8th Avenue Kenosha, Wisconsin	Riley McDavid President John Kolar Personnel Director Survey Liaison

100-199 Beds

Delnor Hospital	975 North 5th Street St. Charles, Ill.	Mr. J. Taft Administrato. Survey Liaison
Beloit Memorial Hospital	431 Olympian Blvd. Beloit, Wisconsin	Roy A. Colwell Administrator William Moore Personnel Manager Survey Liaison

Under 100 Beds

DeKalb Public Hospital	680 Haish Blvd. DeKalb, Ill.	Larry W. Pugh Administrator Survey Liaison
Bethany Brethren	3420 W. Van Buren St. Chicago, Ill.	Vernon C. Showalter Executive Director Milford C. Lady Administrator Survey Liaison

Extended-Care Facilities

Sandra Nursing Home	14325 Blackstone Dolton, Ill.	Mr. Richard Silk Administrator Survey Liaison
Fox River Rehabilitation Center	4700 N. Clarendon Ave. Chicago, Ill.	Mr. Larry Garcia Administrator Survey Liaison

Denver

200 Beds or more

St. Marys Hospital	7th St. & Patterson Rd. Grand Junction, Colo.	Sister Michel, RN Administrator Mrs. Peggy Cannon Personnel Director Survey Liaison
St. Lukes Hospital	601 East 19th Ave. Denver, Colo.	Richard C. Leavitt Administrator Royce Davis Asst. Administrator Survey Liaison

100-199 Beds

Memorial Hospital of Laramie County	Cheyenne, Wyoming	William C. Nichols Administrator D. Paul Vencill Asst. Administrator Survey Liaison
Poudre Valley Hospital	1024 Lemay Ave. Fort Collins, Colo.	J. R. Peterson Administrator Survey Liaison

Under 100 Beds

Alamosa Community Hospital	Alamosa, Colo.	Elton Reese Administrator Survey Liaison
Longmont Community Hospital	1950 W. Mountain View Longmont, Colo.	Henry Amicarello Administrator Survey Liaison

Extended-Care Facilities

Ivy Manor Nursing Home	2939 Vallejo Denver, Colo.	David Zapiler Administrator Survey Liaison
Eventide Nursing	1800 Strow Place Longmont, Colo.	Roger Fell Administrator Survey Liaison

Los Angeles

200 Beds or more

Kaiser Foundation Hospital	13652 Cantara St. Panorama City, CA	Kenneth L. Coston Administrator Survey Liaison
Santa Monica Hospital	1250 - 16th Street Santa Monica, CA	Robert A. Craig Administrator Norman Peterson Asst. Director Survey Liaison

100-199 Beds

Morningside Hospital	8711 S. Harvard Blvd. Los Angeles, CA	T. W. Olson Administrator Survey Liaison
West Valley Hospital	5333 Balboa Encino, CA	Carl Gottschalk Administrator Survey Liaison

Under 100 Beds

Community Hospital of Gardena	1246 W. 155th St. Gardena, CA	Max M. Weinberg Administrator Mrs. Smith Director of Nursing Survey Liaison
Garden Park Hospital	9922 Gilbert St. Anaheim, CA	Edwin Bixby Administrator Survey Liaison

Extended-Care Facilities

Kaiser Extended Care	8015 Woodman Panorama City, CA	Kenneth L. Coston Administrator Survey Liaison
Beverly West Convalescent Hospital	1516 Sawtelle Blvd. Los Angeles, CA	M. Bert Hattenbach Administrator Survey Liaison

Seattle

200 Beds or more

St. Francis Xavier Cabrini Hospital	920 Terry Avenue Seattle, Wash.	Mother Lawrence Administrator Mary Miller, R.A. Survey Liaison
Emanuel Hospital	2801 N. Gantenbein Ave. Portland, Oregon	Personnel Director Survey Liaison

100-199 Beds

St. Josephs Hospital	1006 North H Street Aberdeen, Wash.	Sister Jerome Mary Administrator Survey Liaison
Vancouver Memorial Hospital	3400 Main Street Vancouver, Wash.	Paul S. Griff Administrator Mrs. Leeson Survey Liaison

Under 100 Beds

Tri-State Memorial Hospital	1221 Highland Drive Clarkston, Wash.	William J. Yeats Administrator Survey Liaison
West Seattle General Hospital	2601 SW Webster St. Seattle, Wash.	Bruce M. Burton Administrator Eleanor H. Rhees Survey Liaison

Extended Care Facilities

Mt. Baker Convalescent Home	1700 - 24th St. S. Seattle, Wash.	Mrs. Spore Administrator Survey Liaison
Greenwood Convalescent Home	202 North 110th Street Seattle, Wash.	Arthur L. Marsh Survey Liaison

APPENDIX III

BACKGROUND INFORMATION ON SURVEY RESPONDENTS

The survey respondents reported a variety of different occupational titles. In order to analyze the data for larger groups within the sample population, the myriad titles were consolidated to form the five occupational groups shown in Table A-1. The data for an additional 15 individuals categorized in the "miscellaneous" group are omitted from this section because of failures to provide position title identification.

Table A-2 lists the major responsibilities of the respondents (as indicated on the background sheet by the respondents themselves) within each of the occupational groups. As was expected, these findings tended to corroborate the task performance patterns of the different groups. For example, Radiologists and Chief Radiologic Technologists generally listed their major areas of responsibility on the Respondent Information Sheet as Diagnostic or Supervision/Administration. A quick check of the task performance data for these respondents shows that indeed, they indicated high percentages of performance for the Radiology tasks and the Administrative tasks. This positive relationship between background statements and task performance data holds true for the remaining groups as well.

Table 3 indicates the sex of the respondents in each occupational group. Although almost two-thirds of the total sample is female, the male respondents hold a majority of the higher echelon positions (Radiologist and Chief Technologist).

TABLE A

RESPONDENTS BY OCCUPATIONAL CATEGORIES,
MAJOR RESPONSIBILITIES, AND SEX

Variables	Radiologists	Chief Technologists	Staff Technologists	Technical Support	Non-Technical Support	Total
A-1. OCCUPATIONAL CATEGORIES						
Number	5	34	37	8	17	101
Percent	5	34	37	8	17	100
A-2. MAJOR RESPONSIBILITIES						
Nuclear Medicine/ Isotope Scanning	0	5	2	0	0	7
Darkroom Developer	0	0	0	2	0	2
Clerical	0	0	0	1	13	14
Supervision/ Administration	1	17	0	1	2	21
Quality Control	0	1	0	0	0	1
Diagnostic	3	8	28	1	0	40
No Answer	1	3	7	3	2	16
Total	5	34	37	8	17	101
A-3. SEX						
Male	5	19	6	3	3	36
Female	0	15	31	5	14	65

Table B-1 is a cross-tabulation of the respondents' occupational group and certification. From the data it appears that over two-thirds of the respondents in the total sample hold some form of certification relevant to their job functions. As might be expected, the proportion of respondents holding certification is highest for Radiologists and Chief Technologists, and lowest for the Support Groups. One-fourth of the respondents failed to answer this question, a result that appears to indicate a "sensitive" area in an occupation where certification can be a major factor in job mobility.

Table B-2 shows the highest academic level completed for the different occupational groups. Over 55 percent of the respondents, excluding the Radiologists, reported that they had completed some college work, and only one respondent indicated that he did not finish high school.

TABLE B

RESPONDENTS BY OCCUPATIONAL CATEGORIES,
CERTIFICATIONS HELD, AND EDUCATIONAL ATTAINMENT

Variables	Radiologists	Chief Technologists	Staff Technologists	Technical Support	Non-Technical Support	Total
B-1. CERTIFICATIONS HELD						
Registered Technologist (AART)	0	32	31	0	4	67
M.D.	5	0	0	0	0	5
None	0	0	1	0	2	3
No Answer	0	2	5	8	11	26
Total	5	34	38	8	17	101
B-2. EDUCATIONAL ATTAINMENT						
Less than H.S.	0	0	0	1	0	1
High School or Equivalent	0	9	9	3	8	29
Some College	0	22	18	2	5	47
AA	0	1	3	1	1	6
BA	0	1	2	0	0	3
MA	0	0	0	0	0	0
Other	5	0	3	0	2	10
No Answer	0	1	2	1	1	5
Total	5	34	37	8	17	101

Table C-1 indicates the previous occupations held by the respondents in each occupational group. For the most part, the previous occupations are unrelated to their present positions. Thus, there appears to be little evidence of a career sequence by which an employee may progress from one position to another as he gains experience of additional education and training. These findings clearly indicate the need for curricula and training programs geared to provide occupational mobility, both vertical and horizontal, for employees working in the Radiology occupations.

Table C-2 portrays the mode yearly salary for the respondents within the various occupational groups. As might be expected, the financial earnings of the respondents follow an orderly progression starting with the Support Groups, who reported the lowest salary, and ascending with Staff Technologists, Chief Technologists, and Radiologists.

Table C-3, 4 and 5 present a cross-tabulation of occupational groups by age, years in present position, and years in occupation respectively. With the exception of the Staff Technologists, who were typically younger than the other respondents, the average respondent from the remaining groups was middle-aged, and had been working in his/her present position for at least three years. In addition, the respondents appear to be an experienced group, reporting an average ranging from six to 17 years of employment in the field of Radiology.

TABLE C

RESPONDENTS BY OCCUPATIONAL CATEGORIES AND PREVIOUS OCCUPATIONS
MODE ANNUAL SALARY, MEAN AGE AND AGE RANGE
YEARS IN PRESENT POSITION, AND YEARS IN OCCUPATION

Variables	Radio-logists	Chief Technol-ogists	Staff Technol-ogists	Technical Support	Non-Technical Support	Total
C-1. PREVIOUS OCCUPATION						
Student	2	9	14	0	2	27
X-ray Tech.	0	1	1	0	3	5
Military	0	2	2	1	0	5
Clerk	0	0	1	0	5	6
Miscellaneous	3	9	4	5	3	24
None	0	8	5	1	2	16
No Answer	0	5	10	1	2	18
Total	5	34	37	8	17	101
C-2. MODE ANNUAL SALARY						
	$15,000+	$8-10,000	$6-8,000	$4-6,000	$4-6,000	
C-3. MEAN AGE (RANGE)						
	43.8 (38-56)	39.4 (21-63)	26.2 (19-55)	39.4 (20-66)	35.4 (20-62)	
C-4. YEARS IN PRESENT POSITION						
	6.0	7.6	2.5	5.5	3.1	
C-5. YEARS IN OCCUPATION						
	10.8	16.8	5.5	6.8	7.2	

APPENDIX IV

TASKS PERFORMED BY MISCELLANEOUS RESPONDENTS

Fifteen respondents were given a miscellaneous classification and the data from their responses were deleted from the body of the report. The respondents in this category included students, miscellaneous employees, and respondents who did not identify their position titles. The performance data for this group revealed a low percentage of task performance, such that only 12 of the tasks were performed by 25 percent or more of the respondents. These 12 tasks together with their corresponding performance data are listed below:

	Task	Percentage	Frequency	Dif.
1.	Review patient's clinical history	25	D	E
3.	Load and unload film units	30	D	E
12.	Place patient in radiographic position	25	D	A
18.	Assist physician in special procedures	25	D	A
70.	Operate automatic processing machines	30	D	E
95.	Prepare and maintain index file	25	D	E
109.	Prepare and submit supply requests	25	W	E
127.	Schedule work assignments	25	W	E
178.	Assist patients to or from litters or wheelchairs	60	D	E
179.	Prepare patients for examination	30	D	E

	Task	Percentage	Frequency	Dif.
182.	Label and transfer specimens	25	D	E
194.	Transport patients	35	D	E

APPENDIX V

TASKS NOT PERFORMED BY THE RESPONDENTS

Several of the tasks contained in the survey questionnaire were not performed by any of the survey respondents. These tasks are listed below:

Task:

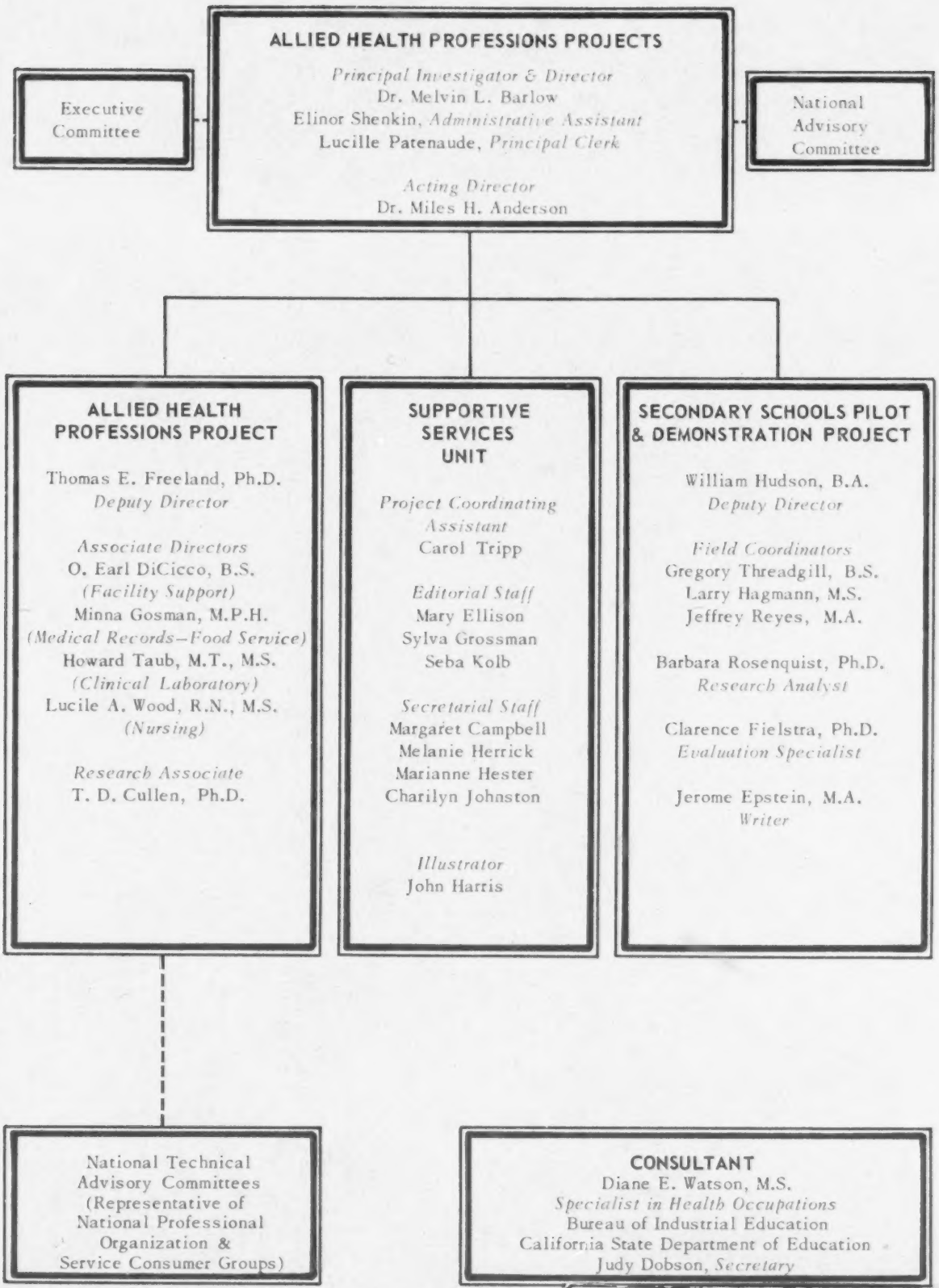
74. Determine radiation level of cadavers prior to autopsy or release to mortuary

76. Load applicators for radium therapy

86. Operate linear acceleration therapy equipment

169. Assemble equipment for research

176. Design forms for maintaining radiology research data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